

REMARKS

Claims 12-22 were rejected in the Final Action. Claim 13 has now been canceled and its limitations have been incorporated into amended claim 12. Therefore, claims 12 and 14-22 are now pending. No new matter has been added.

Applicant asks that the claims be examined in view of the amendment made.

Claim Rejections – 35 USC § 103

Claims 12-15 and 20-22 were rejected under 35 U.S.C. 103(a) as being unpatentable over Fuerschbach (US 4,815,534) in view of Takao et al. (JP 09-138008).

Claims 16 and 17 were rejected under 35 U.S.C. 103(a) as being unpatentable over Fuerschbach (above) in view of Takao et al. (above) and further in view of Watanabe et al. (US 6,928,833).

Claims 18 and 19 were rejected under 35 U.S.C. 103(a) as being unpatentable over Fuerschbach (above) in view of Takao et al. (above) and further in view of Dienhart et al. (US 6,189,334).

The rejections are respectfully traversed.

Pending amended claim 12 is the only independent claim, and it is directed to a heat transfer device comprising a plate heat exchanger (10). The plate heat exchanger includes a package (11) of heat transfer plates. Between adjacent plates are first passages (18) for a heat transfer medium to be cooled and second passages (19) for a cooling agent. First and second porthole channels (21 and 22) communicate with first passages (18), while third and fourth porthole channels (23 and 24) communicate with second passages (19). First porthole channel (21) forms at least part of an inlet channel (31) for supplying heat transfer medium, and second porthole channel (22) forms at least part of an outlet channel (32) for the heat transfer medium.

Third porthole channel (23) forms at least part of an inlet channel (33) for supplying cooling agent, while fourth porthole channel forms at least part of an outlet channel (34) for the cooling agent. The device includes a conduit (5) which extends into the inlet channel (33) for the cooling agent. The conduit (5) also includes a conduit portion (6) which extends into and back out of the outlet channel (34) for the cooling agent, thus permitting heat exchange between the cooling agent within the conduit portion (6) and the cooling agent that surrounds conduit portion (6) within the outlet channel (34). The outlet channel (34) for the cooling agent also includes a pipe (36) extending outwardly from the fourth porthole channel (24) and the plate package. The conduit portion (6) extends at least into and out of the pipe (36). (*See, generally, applicant's Fig. 3.*)

As is explained in the application (page 4, lines 1-19), this device allows the temperature of the cooling agent which is leaving the outlet channel (34) to be raised by coming into heat transfer contact with the relatively warmer cooling agent within the conduit portion (6) and has the beneficial effect of reducing or preventing liquid droplets from exiting the heat exchanger in the cooling agent. In turn, this can extend the lifetime and the efficiency of the equipment.

The Action asserts that Fuerschbach discloses much of the claimed device, but fails to disclose "that wherein the conduit includes a conduit portion extending into and out of the outlet channel for the cooling agent such that heat exchange takes place between the cooling agent in the conduit portion and the cooling agent in the outlet channel." (Action, page 3, last paragraph) Fuerschbach shows short threaded nipples (Fig. 2, elements IH, OH, IC and OC) extending from the porthole channels, but it fails to indicate any conduit portion extending into any one of the porthole channels. Because Fuerschbach is concerned only with the structure of a plate heat exchanger as such, there is no disclosure, teaching or suggestion in the reference for one of ordinary skill in the art concerning how to provide or arrange a conduit or conduit portion for cooling agent as called for by the pending claims.

The Action then refers to Takao et al. and states (Action, page 3) that Takao et al. "teaches wherein the conduit includes a conduit portion (ref 9) extending into and out of the outlet channel for the cooling agent such that heat exchange takes place between the cooling

agent in the conduit portion and the cooling agent in the outlet channel (abstract; Figure 1 illustrates that a portion of the conduit 8a goes into one side of the heat exchanger 3 before entering the expansion valve Exp1. The heat exchanger has two inlets, air inlet and refrigerant inlet, and two outlets, air outlet and refrigerant outlet. The conduit 9 enters the air outlet portion, which is the cooling agent. This [...] outlet would be analogous to the fourth porthole channel of a plate heat exchanger)."

Applicant disagrees that Takao et al. discloses the features not disclosed in Fuerschbach. The outwardly extending pipe of amended claim 12, in which the conduit portion extends, is not disclosed or suggested by Takao et al. Rather, Takao et al. discloses only a schematic representation of a heat exchanger 3. Takao et al. discloses a heat pump arrangement which comprises an outdoor heat exchanger 3 and an indoor heat exchanger 5, and which, due to a four-way valve 2, can operate as a cooling device or as a heating device.

The purpose of Takao et al.'s hot line piping 9 in the cooling arrangement appears to be to prevent ice formation in the evaporator (outdoor heat exchanger 3) (*see*, Takao et al., machine translation, page 3, paragraph [0013]), by controlling the temperature of the refrigerant in hot line piping 9. (*See*, machine translation, page 4, paragraph [0017], and page 6, paragraphs [0028] – [0029].) However, that is not the purpose of applicant's claimed device. As explained at page 4, first paragraph, of the instant application, the present invention aims to raise the temperature of the cooling agent leaving evaporator 4 so as to prevent liquid formation in the evaporated cooling agent.

By contrast, the hot line piping 9 of Takao et al. is not disclosed or suggested as being arranged in an outlet porthole channel of the outdoor heat exchanger 3. Takao et al. does not show how the hot line piping 9 is arranged in the outdoor heat exchanger. Although it might appear that the hot line piping 9 is positioned in the proximity of the outlet of the refrigerant, there is no illustration or statement that it is provided in the outlet passage of the refrigerant as called for by the pending claims. It instead appears that the hot line piping 9 of Takao et al. is provided in the passages for the air passing through the heat exchanger 3. The machine translation states, "the hot line piping 9 that exists in the exterior unit side heat exchanger 3..."

(page 5, paragraph [0022], emphasis added) It is urged that such positioning of the hot line piping 9 in Takao et al. is also logical in view of the purpose of prevention of ice formation in the passages for the air passing through heat exchanger 3.

Thus, it is clear that Takao et al. does not disclose or suggest that the hot line piping 9 is conveyed into and out of an outlet channel for the cooling medium as in the pending claims. There would have been no reason to modify the Takao et al. device and to combine the modified device with Fuerschbach to arrive at the arrangement in applicant's claimed device.

Therefore, the invention claimed in pending claim 12 would not have been obvious to one of ordinary skill in the art at the time the claimed invention was made. It is urged therefore that claim 12 is allowable over the cited references.

Since claims 14-22 all depend directly or indirectly from claim 12, they are also allowable. The disclosures of Watanabe et al. and Dienhart et al. are cited only for certain features called for by dependent claims 16-17 and 18-19, respectively. These references do not disclose or suggest the features missing from the combination of Fuerschbach and Takao et al. The cited art, whether taken in combination or individually, does not disclose or suggest a solution to the problem dealt with by applicant, namely, reducing the presence of liquid droplets in the cooling agent leaving the plate heat exchanger, and the cited art does not disclose or suggest the claimed invention.

Conclusion

In any event, for at least the reasons indicated above, all pending claims are allowable and the issuance of a notice of allowance is proper and is urged.


It is believed that all of the pending claims have been addressed. However, the absence of a reply to a specific rejection, issue or comment does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this

paper, and the amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment.

This paper is being filed on the Electronic Filing System (EFS). Please apply the RCE filing fee, the fee for a three-month extension of time and any charges or credits to deposit account 06-1050.

Respectfully submitted,

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